(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(54) Title: WWW SEARCH ENGINE COMBINING SEVERAL SEARCH CRITERIA AND PROVIDING ALERT MESSAGES TO USER
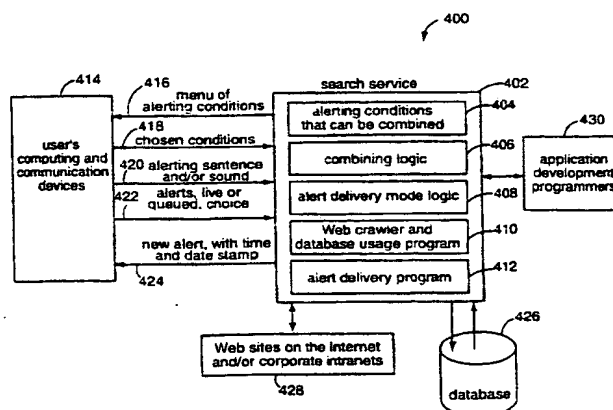
(57) Abstract: A data mining and annunciator system provides users with automated Internet searches conducted according to express user constraints and keyword combinations. Users with browsers and Internet-connected computers log-on to a search service maintained by a website host. Such search service collects a per-use fee or subscription fee for its assistance. Each user chooses an alert criteria that requires the logical-AND of several search conditions to be true. The classes of information searched and returned from the Internet can be independent, and the only thing that correlates them all is a particular user's interest. Repeated, extensive searches are made of all the relevant and available informational websites for all users' criteria from the search-service webserver. If all the constraints in a particular user's search criteria are met, such fact is annunciated to that user. Recorded or text-to-speech converted voice messages composed by the user-recipient are sent to pre-arranged e-mail addresses or telephone numbers. Text messages are also sent by e-mail or posted to an announcement board reserved for the user at the search-service webpage.

WWW SEARCH ENGINE COMBINING SEVERAL SEARCH CRITERIA AND PROVINDING ALERT MESSAG
ES TO USER

BACKGROUND OF THE INVENTION

5

TECHNICAL FIELD

The present invention relates to automated data searching systems, and more particularly to automated systems that browse the Internet looking for

10   combinations of data, and then annunciate with speech, sounds, and text the results of a successful search.

DESCRIPTION OF THE PRIOR ART

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The Internet is proving more and more to be a valuable source of information. But very often the information one needs is not present when an informational search is launched, or the whole research question cannot be answered unless several websites are consulted.

20

For example, job searches on the Internet are now conventional. Prior art systems allow job searchers to scan the available jobs in their field and learn some facts about the experience and education required, as well as the benefits of the position. However, for many job hunters the job itself is only one

25   consideration. The quality of schools in the area, as measured by SAT performance scores, and the property and income tax rates are just as important. In Silicon Valley, the average selling price of a home or the time needed to commute to affordable housing are also considerations. When many jobs are searched, and each job location must also be searched for quality-of-life factors

30   like schools and real estate, the amount of effort needed to conduct a manual search can be daunting.

Some alarm annunciation systems depend on pagers and phones to alert responsible persons. One such system makes sure at least one person on a list

35   responses to the alarm, otherwise it continues to phone or page additional people on the same list. Such is described by Carlos Escolar in United States

Patent 5,748,078, issued May 5, 1998. This system simply waits for an alarm from a monitored device. It does not actively search out for combinations of conditions.

5   Mon-Mei Chen, et al., describe a network-based multimedia messaging system in United States Patent 5,751,791, issued May 12, 1998. A caller on the phone is given a prerecorded greeting when the callee is unavailable. The caller is then able to leave a multimedia message. Once the message is collected, the callee is notified a message is waiting. This system too passively waits for a single-
10   point alarm condition to develop. It does not actively and repeatedly browse the Internet and evaluate HTML-coded browser pages for particular combinations of keywords or responses.

A "Collaborative Internet Data Mining System" is described by Kenneth
15   Appleman, et al., in United States Patent 6,081,788, issued June 27, 2000. Human "guides" are used to maintain websites in their respective topic areas. They conduct their own searches and post "authoritative" webpages for users to view. A computer-based method is used to select, train, and police Internet guides for predetermined topic areas. Such a system does not service
20   individuals well who have unique requests for information that require the logical-combination of data from many sources before presentation to the user.

25   <u>**SUMMARY OF THE INVENTION**</u>

Briefly, a data mining and annunciator embodiment of the present invention provides users with automated Internet searches conducted according to express user-constraints and keyword combinations. Users with browsers and
30   Internet-connected computers log-on to a search service maintained by a website host. Such search service collects a per-use fee or subscription fee for its assistance. Each user chooses an alert criteria that requires the logical-AND of several search conditions to be true. The classes of information searched and returned from the Internet can be independent, and the only thing that correlates
35   them all is a particular user's interest. Repeated, extensive searches are made of all the relevant and available informational websites for all users' criteria from the search-service webserver. If all the constraints in a particular user's search criteria

are met, such fact is annunciated to that user. Recorded or text-to-speech
converted voice messages composed by the user-recipient are sent to pre-
arranged e-mail addresses or telephone numbers. Text messages are also sent
by e-mail or posted to an announcement board reserved for the user at the

5   search-service webpage.

BRIEF DESCRIPTION OF THE DRAWINGS

10   Fig. 1 is a functional block diagram of a data mining and annunciator system
embodiment of the present invention;

Fig. 2 is a flowchart diagram of a data mining and annunciator method
embodiment of the present invention;

15
Fig. 3 is a diagram of a browser screen that can be presented to a user by the
webserver in order to collect search criteria, preferences, and other information;

Fig. 4 is a functional block diagram of a data mining and annunciator system
20   embodiment of the present invention; and

Fig. 5 is a diagram represented an alert screen graphic that may be generated by
the systems of Figs. 1-4.

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DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 represents a data mining and annunciator system embodiment of the
present invention, and is referred to herein by the general reference numeral 100.
30   Such system can be used to collect a per-use fee or subscription fee for its
assistance to users. Each user chooses an alert criteria that requires the logical-
AND of several search conditions to be true. The classes of information searched
and returned from the Internet can be independent, and the only thing that
correlates them all is a particular user's interest. Repeated, extensive searches
35   are made of all the relevant and available informational websites for all users'
criteria from the search-service webserver. If all the constraints in a particular
user's search criteria are met, such fact is annunciated to that user. Recorded or

text-to-speech converted voice messages composed by the user-recipient are sent to pre-arranged e-mail addresses or telephone numbers. Text messages are also sent by e-mail or posted to an announcement board reserved for the user at the search-service webpage.

5

The system 100 includes a web-browser appliance 102 connected to the Internet 104. A search-service webserver 106 is accessible to the web-browser appliance 102 and can access itself many other websites, e.g., as represented by informational websites 108-111. For example, the website 108 can provide
10   current listings for careers and job openings around the country. Website 109 lists data about schools, and website 110 is maintained by real estate sales offices and lists homes for sale in specific parts of the country. Website 111 represents websites that can be searched but have no data that matches current user search criteria.

15

A critical difference between embodiments of the present invention and conventional search engines is how matches are made. The embodiments of the present invention search in more than one dimension. Conventional search engines use groups of keywords to find all sites that include the required mix of
20   keywords. The embodiments of the present invention search in a first dimension, e.g., available jobs, until a match is found, such as software engineer. Machine intelligence is used to query, "where is the job located?". In alternative embodiments of the present invention, human operators can be used to help interpret intermediate results and continue the on-going searches in the right
25   directions.

The location of the software engineer job, for example, is then used in a second dimension to find available real estate in that area. The prices of the available real estate is then matched to the pricing constraints defined by the user. If accepted
30   on both job type and housing prices, a first and second dimension, then a third dimension search can launch to gauge the quality of schools in the area. Once schools in the area are found, then some measure like their SAT student scores is searched. If the SAT scores meet the user's data-mining criteria, then an alert message can be sent to the annunciator. If there are more dimensions to the
35   search, then those branches are followed as in a hierarchical tree.

The web-browser appliance 102 is preferably capable of sound and voice output. A voice input is also preferred to allow the pre-recording of annunciator messages. Desktop personal computers, laptop portable computers, and Internet-capable wireless telephones can all provide good results. A standard wireless pager could

5   also be used to receive annunciator alerts and text. The web-browser appliance 102 could actually be several devices distributed in more than one location, e.g., personal computers, cellular phones, and wireless pagers.

In operation, a user enters a multi-part search criteria and alert preferences after

10   logging onto a webpage hosted by the search-service webserver 106. A subscription or per-use fee may be charged to the users. The informational websites 108-111 are repeatedly and exhaustively searched for matches to parts of the whole search criteria. A recursive search engine included within the Internet-connectable web server provides conditional tests of early provided data from the

15   automated search of informational websites. Such is used to redirect a continuing search according to an intermediate and fractional information recovered. The webserver 106 repeatedly searches available informational sources according to the set of conditions in logical combinations included in a data-mining job. When all the search criteria can be satisfied with information returned from all available

20   websites 108-111, the user is alerted according to the user's preferences. This includes alert sounds, voice tracks, and text messages delivered to specified URL's, e-mail addresses, phone numbers, and pagers.

When the system detects that the alert conditions are satisfied, the relevant

25   alerting sentence and/or sound is played through the user's computing device, prefixed with the time and date. If the user typed in an alerting sentence, such sentence and date/time is played through voice synthesis software and/or hardware. Additional details about the alert may appear on the user's display screen.

30

To determine whether the alert conditions are satisfied, the system may conduct repeated, extensive searches of sites on the network. During a search, the system may automatically navigate through linked pages of information on the network, and may logically combine selected results from several different pages

35   to synthesize the data against which the alert conditions are tested. For example, the user could ask the system to find a certain kind of job in an area in which the high schools show strong SAT scores, and the property taxes are moderate.

The system will then make searches of different parts of the network about Careers, Education, and Real Estate, and will logically combine the results to see if they meet the alerting conditions.

5   A preferred but non-limiting embodiment of the method and system is in the form of a user's computing device (such as a PC, a WebTV, or an internet-enabled cellphone) connected to the internet. The user sets alert conditions using a web-browser connected to an internet alerting service. The user also types in, or makes available a recording of, an alerting sentence. The user's computing

10   device either remains connected to the internet, or automatically reconnects at intervals that the user specifies. When one or more of the sets of alert conditions are satisfied, the correct alerting sentences and/or sounds are played. The user may optionally request that the alerts be queued for later replay, e.g. while the user is sleeping. When the alerts are replayed, the time and date prefixes inform

15   the user when the alerts happened.

Fig. 2 represents a method embodiment of the present invention for supplying audio alerts, and is referred to herein by the general reference numeral 200. In a step 202, a user specifies a set of conditions. These conditions all must later be

20   satisfied by intermediate search results before any alert can be generated. Alert preferences are then entered. Such user types in, voice records, or picks from a menu the desired message to be received in a step 204. This message can act to remind the user what the search was about because it can be days, weeks, or months before an intersection of all the search conditionals is detected in the

25   space of all the available informational websites. The user also specifies in a step 206 whether alerts are to be received immediately when they are generated, or be queued for later delivery on demand when it is more convenient. In a step 208, a search service retrieves relevant answers from accessible websites. The search service then logically combines the retrieved

30   facts in a step 210, and determines in a step 212 whether any resulting combination satisfies the conditions for a user alert. If the conditions are satisfied, a new alert is checked in a step 214 against previous alerts sent to this user to ensure that it is indeed new. If so, the alert is labeled in a step 216 with the current time and date and sent to the user's computing device.

35
Fig. 3 represents a fill-in-the-blanks browser form 300 that the webserver 104 generates HTML-code for and presents over the Internet 106 to a typical user

browser 102. A first section "Choose Alert Criteria" provides a place for the user to define a multi-dimensional search. In this example, a combination of business, home, and education are used to automatically and recursively hunt Internet informational websites for only those offered jobs that are looking for software
5   engineers, paying at least $106K, where property taxes run $3K-$4K, median house prices are $150K-$200K, and SAT II scores for local high schools run 600-650 points. A second section, "Choose How You Would Like to be Alerted" allows the alert preferences to be set. A box for a fill-in sentence allows the user to define a message on alert that will refresh memory or otherwise be
10   informative even months later. Other buttons can provide a way to record a short audio message. A third section, "Choose To Receive the Alert Immediately or Later" allows the user to decide whether alerts are to be issued as generated or collected for periodic review. Some search criteria may produce only one alert in months of automated searching, and an immediate alert can help avoid repetitive
15   checking-in and finding nothing by the user.

Fig. 4 represents a system embodiment of the present invention, and is referred to herein by the general reference numeral 400. The system 400 includes a search service 402 comprising an alert-condition memory 404, a combining logic
20   406, an alert delivery mode logic 408, a web-crawler and database manager 410, and an alert delivery program 412. A user's computing device 414, such as a PC, a PDA, or a cell phone, receives an alerting conditions menu 416. The user chooses conditions from menu and sends such criteria 418 back to the combining logic 406. The user also provides a sentence and/or sound 420 to
25   be used if the conditions for an alert are met. A preference 422 is returned that controls whether an alert 424 is to be issued in real-time or to be batched for periodic inquiry.

The search criteria 416 are processed by the combining logic 406 and sent as a
30   multi-part search request to the webcrawler and database update program 410. A database 426 is consulted for previous search results that could be useful in the current task. For example, conditions may have been set and results found already on a particular kind of job, an area in which the schools show strong SAT scores, and an area in which the property taxes are moderate. In response to a
35   request from the combining logic 406, the database management program 410 may be able to use the results of previous searches to immediately satisfy a current user's criteria. The program 410 also launches its webcrawler to survey

any informational websites 428 that may have needed information not already in the database 426. Any relevant results from the webcrawler search are combined to form new alerts, and are stored in the database 426 for later use by this and other users. Authorized application development programmers 430 can

5   embed into program code 410 policies for removing outdated information from the database 426. Once the conditions for an alert are satisfied, the alert delivery program 412 checks if the alert is new to this user. If so, it appends the date and time to an alert message and either sends it to the user's computing device, or queues it for later delivery.

10

In some embodiments, the database 426 includes a relational database management system, e.g., Oracle 8i. The search service 402 can be implemented with SQL or other industry standard database language modules. In particular, SQL modules written by application programmers can include

15   alerting conditions 404, combining logic 406, alert delivery mode logic 408, database usage program 410, and alert delivery program 412. Those parts of the application software not written in SQL may be implemented in PERL, Java, or other commercial software products that can make use of SQL statements. Network transmission and secure login via user ID and password may be

20   enabled by a webserver program, such as Apache server (http://www.apache.org/httpd.html), iPlanet Server (http://www.iplanet.com/products/infrastructure/web_servers/index.html), etc.

Fig. 5 represents a webpage 500 that provides user alert details. An alert

25   delivered to a user can include sounds and messages delivered separately or together to a user annunciator terminal, such as a cell phone or an internet-enabled PDA. Details of the alert are then available in the webpage 500 that can be logged onto over the Internet. A sentence 502 that the user typed in (as in Fig. 3) to say how an alert is to be described is replayed. Such alert has a reference

30   number and the day and time repeated in a line 504. The respective ways in which each of the user's original criteria were satisfied are listed in lines 506, 508, and 510. these all include hyperlinks for the user to jump to the original webpage the webcrawler found. The user can then easily apply for the job, contact the realtor, and view the information about the high schools.

35

In alternative embodiments of the present invention, not all the searches according to one criteria may depend on the answers obtained in another of the

user's criteria. Such happenstance allows for parallel independent searches to be conducted by the webcrawler 410 (Fig. 4) and the results to be asynchronously deposited in the database 426. However, at least one search criteria must be complete and not depend on answers to any of the user's other criteria because

5   this would otherwise create a lockup condition. It therefore falls on the combining logic 406 and web-crawler 410 to not fall prey to lockup conditions and to recognize opportunities for parallel searching.

Although the invention is described herein with reference to the preferred

10   embodiment, one skilled in the art will readily appreciate that other applications may be substituted for those set forth herein without departing from the spirit and scope of the present invention. Accordingly, the invention should only be limited by the Claims included below.

CLAIMS

5   1. A data-mining and annunciator system, comprising:

an Internet-connectable web browser for a user and having a graphics display for messages, an audio input for recording voice tracks, and an audio output for alert sounds and voices;

an Internet-connectable webserver for generating a homepage presence
10   that can accept a data-mining job from said user and user-alert preferences, and for providing an automated search of informational websites on the Internet that are dependent on a set of conditions included in said data-mining job;

a recursive search engine included within the Internet-connectable web server for providing conditional tests of early provided data from said automated
15   search of informational websites, and for redirecting a continuing search according to an intermediate and fractional information recovered, and for repeatedly searching informational sources according to said set of conditions in logical combinations included in said data-mining job;

an annunciator for providing an alert message to said user according to
20   said user-alert preferences when said set of conditions included in said data-mining job results in a match;

wherein, said user launches said data-mining job and need not wait around for any immediate results; and

wherein, said user depends on receiving an alert from the annunciator to
25   check for search results.

2. The system of claim 1, wherein:

the Internet-connectable web browser comprises more that one device at one location.

30

3. The system of claim 1, wherein:

the Internet-connectable web browser comprises at least one device each at more than one location.

35   4. The system of claim 1, wherein:

the Internet-connectable web browser comprises at least one of a personal computer, a cellular telephone, and a pager.

5. The system of claim 1, wherein:

      the Internet-connectable web server is such that said data-mining job from said user includes a plurality of criteria that can be used in individual searches, and

5   at least one such individual search depends on an answer obtained from another of said individual searches.

6. The system of claim 1, further comprising:

      a database management system for receiving and storing intermediate

10   answers to a part of said data-mining job obtained in individual searches according to said criteria.

7. The system of claim 1, wherein:

      the Internet-connectable web server includes a search service comprising

15   a criteria combining logic, an alert delivery mode logic, a webcrawler, a database manager, and an alert delivery program.

8. The system of claim 1, wherein:

      the recursive search engine allows a human operator to assist it in finding

20   website information that satisfies said criteria.

9. The system of claim 1, wherein:

      the annunciator accepts text messages typed in by said user at said Internet-connectable web browser to be returned in an alert message.

25

10. The system of claim 1, wherein:

      the annunciator accepts voice recordings entered by said user at said Internet-connectable web browser to be returned in a spoken alert message.

30   11. The system of claim 1, wherein:

      the annunciator displays details of an alert message in a webpage posted by the webserver.

12. The system of claim 1, wherein:

35   the annunciator displays hyperlinks in a webpage posted by the webserver that allow said user to visit an informational webpage that satisfied some part of said criteria.

13. The system of claim 1, wherein:

    the annunciator displays a set of corresponding hyperlinks in a webpage posted by the webserver that allow said user to visit each and every

5   informational webpage that together satisfied said criteria.

14. An information retrieval system, comprising:

    an Internet-connectable web browser for a user and having a graphics display for messages, an audio input for recording voice tracks, and an audio

10   output for alert sounds and voices;

    an Internet-connectable webserver for generating a homepage presence that can accept a data-mining job from said user and user-alert preferences, and for providing an automated search of informational websites on the Internet that are dependent on a set of conditions included in said data-mining job;

15   a recursive search engine included within the Internet-connectable web server for providing conditional tests of early provided data from said automated search of informational websites, and for redirecting a continuing search according to an intermediate and fractional information recovered, and for repeatedly searching informational sources according to said set of conditions in logical

20   combinations included in said data-mining job;

    a database management system for receiving and storing intermediate answers to a part of said data-mining job obtained in individual searches according to said criteria; and

    an annunciator for providing an alert message to said user according to

25   said user-alert preferences when said set of conditions included in said data-mining job results in a match;

    wherein, said user launches said data-mining job and need not wait around for any immediate results;

    wherein, said user depends on receiving an alert from the annunciator to

30   check for search results;

    wherein, the Internet-connectable web browser comprises at least one of a personal computer, a cellular telephone, and a pager;

    wherein, the Internet-connectable web server is such that said data-mining job from said user includes a plurality of criteria that can be used in individual

35   searches, and at least one such individual search depends on an answer obtained from another of said individual searches;

wherein, the Internet-connectable web server includes a search service comprising a criteria combining logic, an alert delivery mode logic, a webcrawler, a database manager, and an alert delivery program;

wherein, the recursive search engine allows a human operator to assist it in finding website information that satisfies said criteria;

wherein, the annunciator accepts text messages typed in by said user at said Internet-connectable web browser to be returned in an alert message;

wherein, the annunciator accepts voice recordings entered by said user at said Internet-connectable web browser to be returned in a spoken alert message;

wherein, the annunciator displays details of an alert message in a webpage posted by the webserver;

wherein, the annunciator displays hyperlinks in a webpage posted by the webserver that allow said user to visit an informational webpage that satisfied some part of said criteria;

wherein, the annunciator displays a set of corresponding hyperlinks in a webpage posted by the webserver that allow said user to visit each and every informational webpage that together satisfied said criteria.
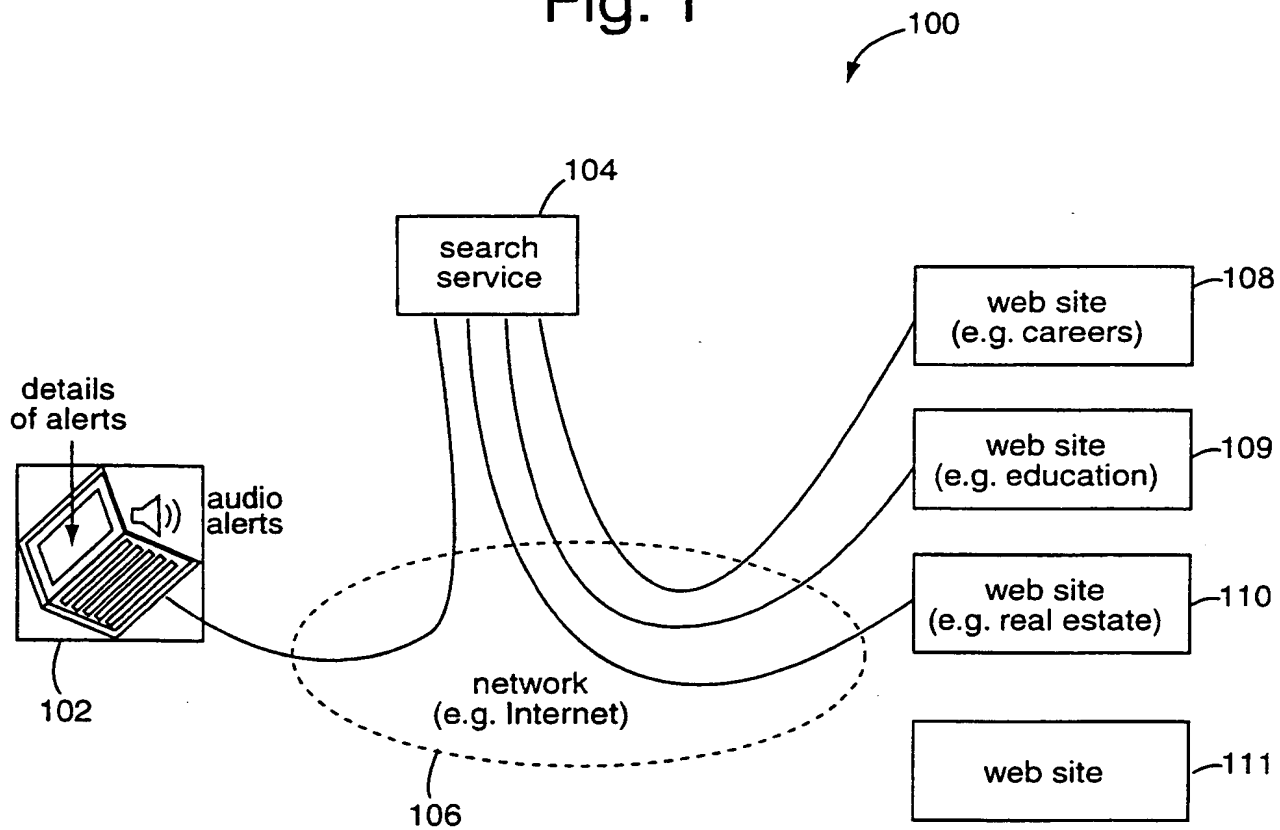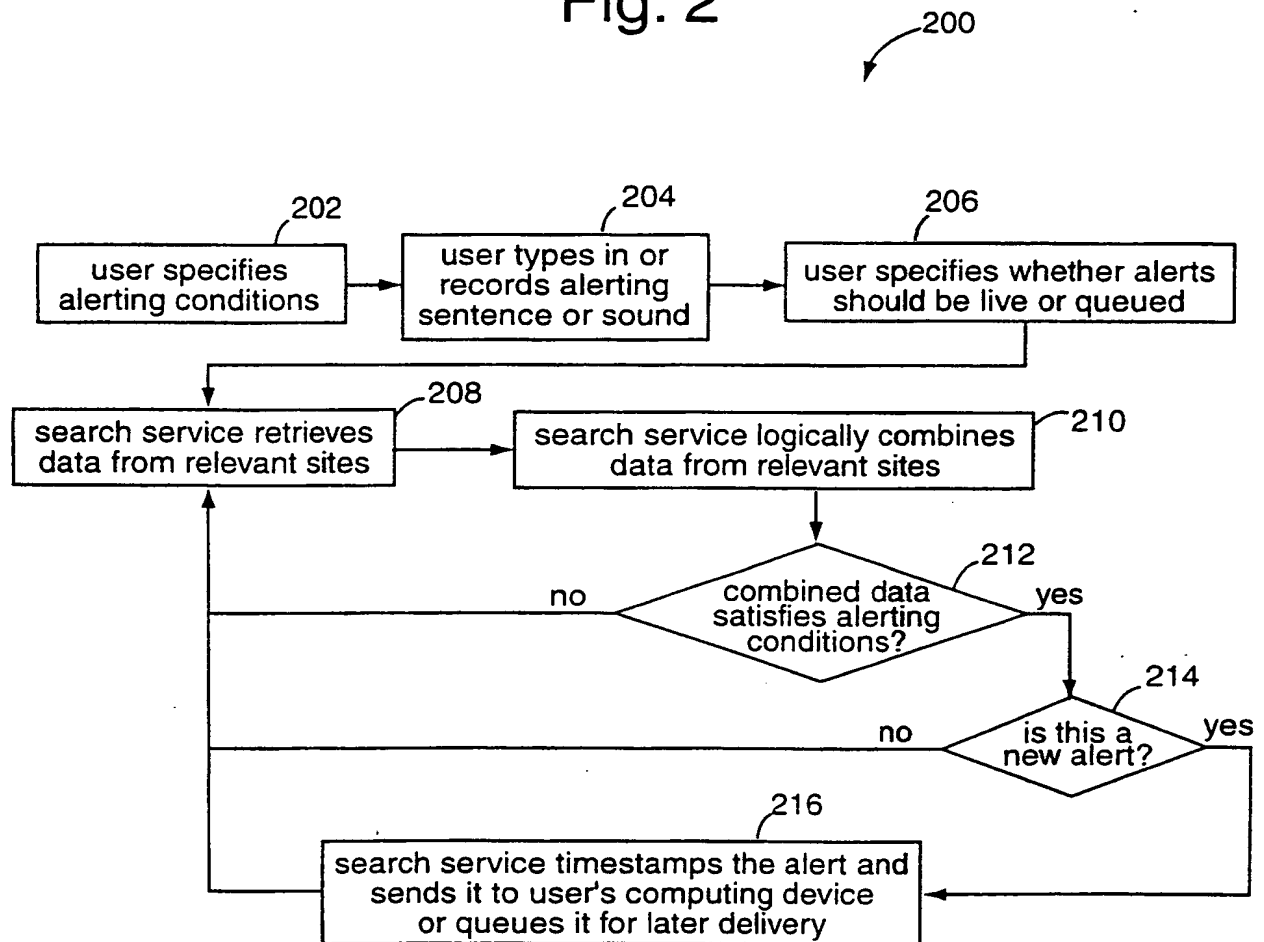
Fig. 1

100

104

search
service

details
of alerts

audio
alerts

102

web site
(e.g. careers) 108

web site
(e.g. education) 109

web site
(e.g. real estate) 110

network
(e.g. Internet)

106

web site 111

Fig. 2

Fig. 3

300

1. Choose Alert Criteria

Business

Jobs: [Software Engineer ▼]   Salary [$106K-$110K ▼]

Home

Property Taxes [$3.000-$4,000 ▼]   Median House Price [$150K-$200K ▼]

Education

High School SAT   [SAT II ▼]   scores   [600-650 ▼]

2. Choose How You Would Like To Be Alerted

type in a sentence [Mobile Engines has found a great place to live!]

or record a sentence or sound   [start recording] [stop recording] [replay]

3. Choose To Receive the Alert Immediately or Later:

◉ Immediately   ○ Later

Fig. 4

400

414

416 menu of alerting conditions

search service 402

404

alerting conditions that can be combined

418 chosen conditions

user's computing and communication devices

430

406

combining logic

420 alerting sentence and/or sound

application development programmers

408

alert delivery mode logic

422 alerts, live or queued, choice

410

Web crawler and database usage program

new alert, with time and date stamp

412

alert delivery program

424

Web sites on the Internet and/or corporate intranets
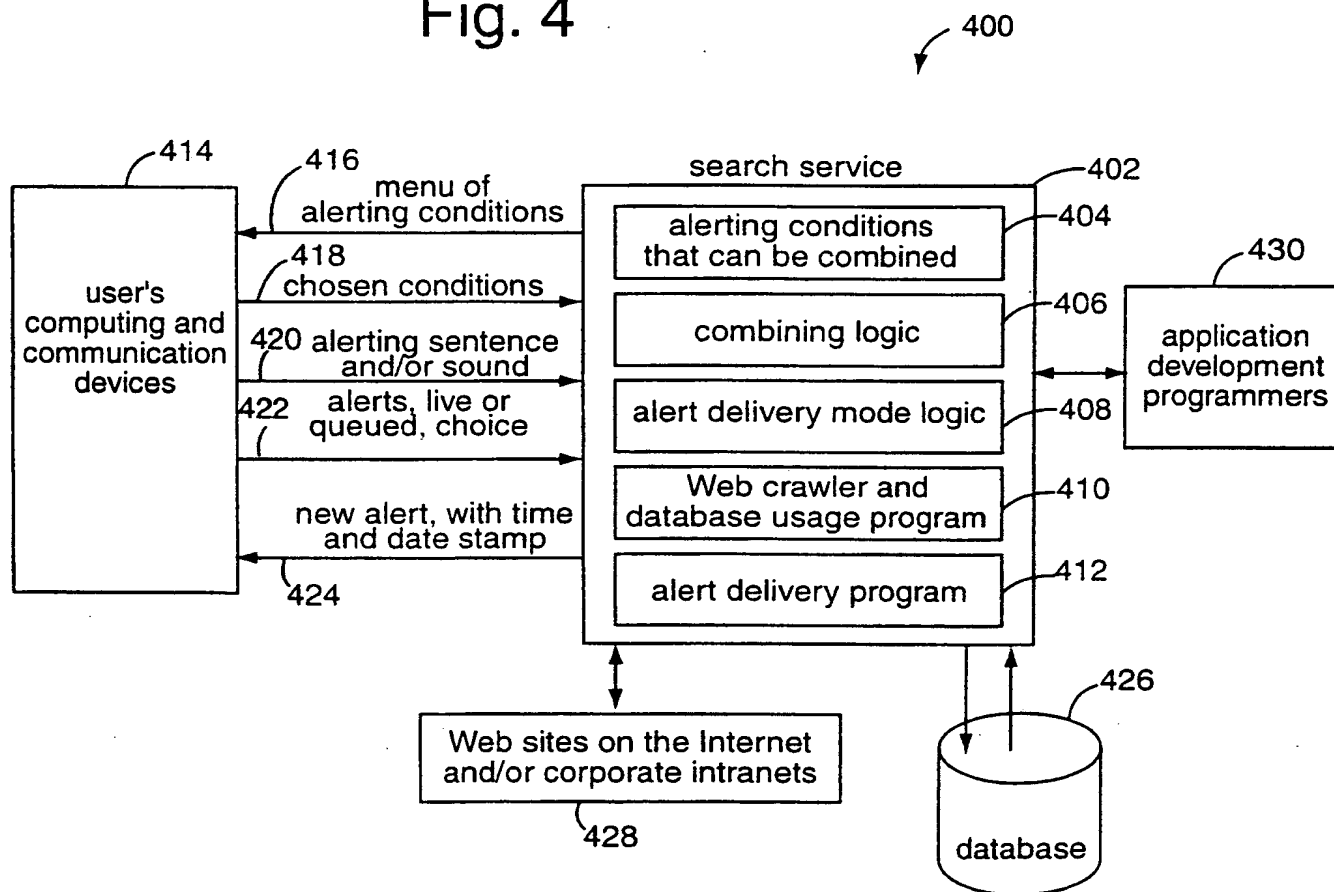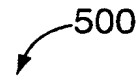
426

428

database

Fig. 5

500

Mobile Engines Has Found a Great Place to Live! 502

Here are the details of your alert number 105, 5:15 PM EST July 4th 2000 504

* Software Engineer Position open at GE in Schenectady New York, salary $107K Apply 506

* 4-bedroom house for sale for $190K at 1366 Skyline Drive in Schenectady Realtor Listing 508

* Median SAT II score in Schenectady High Schools is 610 Schools Listing 510

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7   G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LING LIU ET AL: "CONQUER: a continual query system for update monitoring in the WWW" COMPUTER SYSTEMS SCIENCE AND ENGINEERING, MARCH 1999, CRL PUBLISHING, UK, 'Online! vol. 14, no. 2, pages 99-112, XP002151925 ISSN: 0267-6192 Retrieved from the Internet: <URL:http://www.cse.ogi.edu/{lingliu/CQ/publication.html> 'retrieved on 2000-11-03!	1,2,4, 6-8, 11-13
A	abstract page 2, line 27 - line 34 page 3, line 17 - line 36 page 6, line 5 -page 7, line 14 page 8, line 18 -page 10, line 17; figure 1 page 18, line 13 - line 37; figures 2,3 --- -/--	14

[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

3 November 2000

Date of mailing of the international search report

17/11/2000

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page 1 of 2

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 855 015 A (SHOHAM YOAV) 29 December 1998 (1998-12-29)	1,2,4, 6-8, 11-13
A	column 4, line 33 - line 41 column 7, line 65 -column 9, line 42; figures 4,5	5,14
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